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Computer science
19/sci01/010

1 $\int x^2 \sin x \, dx$

$\int u\,dv = uv - \int v\,du$ ...(1)

For $\int u\,dv = \int x^2 \sin(x)\,dx$

$u = x^2 \Rightarrow du/dx = 2x$

$du = 2x\,dx$

$dv = \sin(x)\,dx$

$\int dv = \int \sin(x)\,dx$

$v = -\cos(x)$

Sub

$\int x^2 \sin(x)\,dx = -x^2\cos(x) - \int(-2x\cos(x))\,dx$

$\int x^2 \sin(x)\,dx = -x^2\cos(x) - \int(-2x\cos(x))\,dx$

$\cancel{\int x^2}$ $v = x \Rightarrow du/dx = 1 \Rightarrow du = dx$

$dv = \cos(x)\,dx \Rightarrow \int dv = \int \cos(x)\,dx$

$v = \sin(x)$

$\int x\cos(x)\,dx = x\sin(x) - \int \sin(x)\,dx$

Since $\int \sin(x)\,dx = -\cos(x)$ This becomes

$\int x\cos(x)\,dx = x\sin(x) + \cos(x)$ ...(

$\int x^2 \sin(x)\,dx - x^2\cos(x) + 2\int x\cos(x)\,d$

sub in 3 to 2

$\int x^2 \sin(x)dx = -x^2\cos(x) + 2(x\sin x) + \cos x)$

$\int x^2 \sin(x)dx - x^2\cos(x) + 2x\sin(x) + 2\cos(x) + C$

(2) $\int 3te^{2t}dv$

$\int v\,dv = uv - \int v\,du$

let $u = 3t$

$du/d_0 = 3$ so $dv = 3dt$

let $dv = e^{2t}d_v$

$v = \frac{1}{2}e^{20}$

$\int 3t(e^{2t})dv = 3t(\frac{1}{2})e^{2t} - \int \frac{1}{2}e^{26}3d$

$\frac{3}{2}te^{2t} - \frac{3}{4}e^{2t}$

(3) $\int 2x^2 \times \ln x\,dx$

$2\times \int x^2\ln(x)dx$

$2\times\ln(x)\times x^2dx$

$\int u\,dv = uv - \int v\,du$

$u = \ln(x)$

$dv = x^2dx$

$v = \int dv$ $du = \frac{1}{x}dx$ $v = x^3/3$

$2(\ln|x)\times x^3/3 - \int x^3/3 \times 1/x\,dx)$

$\int u\,dv = uv - \int v\,du$

$\int 2x^2\ln x\,dx = 2(\ln x \times x^{1/3}) - \int x^3/3 \times 1/2$

$2x^2\ln x\,dx = 2(\ln x - x^3/3 - \int x^2/3\,dx\,dx$

$$\therefore \int \frac{2x - 3x^2}{1 - x} = \frac{-5 + 2x + 3x^2}{2} + \, ^1(\int 1 - x1)\, x$$